

## **Title: The Case of the Jinxed Jewels**

### **Brief Overview:**

This unit includes various tasks that help the students solve the imaginary “crime” of who stole Mrs. Ima Sorich’s necklace. Each student task provides a “clue” to help solve the mystery by eliminating suspects. In addition, each lesson focuses on one of four aspects of NCTM Standard 2: Patterns, Functions, and Algebra. These foci are patterns, symbols, functions, and models.

### **Links to NCTM 2000 Standards:**

- **Standard 1: Number and Operation**  
Students will understand numbers, ways of representing numbers, relationships among numbers, and number systems. They will also understand the meaning of operations and how they relate to each other.
- **Standard 2: Patterns, Functions, and Algebra**  
Students will understand various types of patterns and functional relationships; use symbolic forms to represent and analyze mathematical situations and structures; and use mathematical models and analyze change in both real and abstract contexts.
- **Standard 3: Geometry and Spatial Sense**  
Students will use visualization and spatial reasoning to solve problems both within and outside of mathematics.
- **Standard 6: Problem Solving**  
Students will solve problems as part of understanding mathematics; build new mathematical knowledge through work with problems; apply a wide variety of strategies to solve problems and adapt the strategies to new situations; and monitor and reflect on their mathematical thinking in solving problems.
- **Standard 7: Reasoning and Proof**  
Students will recognize reasoning as an essential and powerful part of mathematics; make and investigate mathematical conjectures; develop and evaluate mathematical arguments; and select and use various types of reasoning.
- **Standard 8: Communication**  
Students will organize and consolidate their mathematical thinking to communicate with others; express mathematical ideas coherently and clearly to peers, teachers, and others; express their mathematical knowledge by considering the thinking and strategies of others; and use the language of mathematics as a precise means of mathematical expression.
- **Standard 9: Connections**  
Students will recognize and use connections among different mathematical ideas; understand how mathematical ideas build on one another to produce a coherent whole; and recognize, use, and learn about mathematics in contexts outside of mathematics.
- **Standard 10: Representation**  
Students will create and use representations to organize, record, and communicate mathematical ideas; develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately; and use representations to model and interpret physical, social, and mathematical phenomena.

**Grade/Level:**

Grades 3-5

**Duration/Length:**

3-6 lessons, 30-45 minutes each

**Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

- Basic operations
- Geometric shapes and names
- Basic patterns
- Cooperative learning

**Student Outcomes:**

Students will:

- identify, describe, and extend geometric and numeric patterns, including growing and shrinking patterns.
- represent and record patterns using a table.
- identify and describe relationships between two quantities that vary together.
- identify and use relationships between operations to solve problems.
- represent and investigate how a change in one variable relates to the change in a second variable.

**Materials/Resources/Printed Materials:**

- Student Resource Sheets #1-8
- Teacher Resource Sheets #1-6
- Necklace materials: Colored circular cereal (if unavailable, beads or colored cubes)
- Pieces of 18" string (if cereal or beads are used)
- Pattern blocks (including trapezoids and hexagons)
- Crayons, markers, or colored pencils

**Development/Procedures:****Lesson 1: Introducing “The Case of the Jinxed Jewels”**

1. Distribute Student Resource Sheet #1.
2. Discuss the purpose of the lessons (to find the thief).
3. Distribute Student Resource Sheet #2.
4. Discuss newspaper format; divide students into groups to determine the who, what, when, where, and why of the article.
5. Create a class list of suspects and what is known about them.

**Lesson 2: “Curious Clues”**

1. Divide students into groups; distribute Student Resource Sheet #3. (one to each group) and have students cut “clues” apart. Each student gets one clue to share with others in their group.

2. Distribute Student Resource Sheets #4a & b and necklace materials.  
(When distributing necklace materials, be sure that each student has at least 10 red, 8 green, 6 blue, 4 purple, 1 orange, and 8 yellow pieces to work with.)
3. Have students complete the task.

### **Lesson 3: “Crack the Code”**

1. Divide students into groups; distribute Student Resource Sheets #5a & b to each student.
2. Have students complete the task on their own.

### **Lesson 4: “Turning the Tables Topsy Turvy”**

(This lesson is optional and is not needed to solve the mystery.)

1. Divide students into groups; distribute Student Resource Sheets #6a, b, & c to each student.
2. Work through examples with students using trapezoid pattern blocks as models.
3. Have students complete the task on their own.

### **Lesson 5: “Who Sits Where?”**

1. Divide students into groups; distribute Student Resource Sheets #7a & b to each student.
2. If necessary, distribute trapezoid pattern blocks to students.
3. Work through Clues #1 and 2 to develop the concept of logic problems.
4. Have students complete the task on their own.

### **Lesson 6: “Wanted!”**

1. Distribute Student Resource Sheet #8 and crayons/markers to each student.
2. Review the 5W’s: who, what, when, where, and why.
3. Have students complete the poster, including a picture of the thief. The students need to answer the 5W questions in complete sentences.

### **Performance Assessment:**

Students will be evaluated on their group participation and performance, as well as their written responses on student worksheets (Student Resource Sheets #1-7). Students will also complete the “Wanted!” poster (Student Resource Sheet #8) and correctly identify the thief. Student work can be scored using Teacher Resource Answer Keys (Teacher Resource Sheets #1-5). Refer to wanted poster scoring rubric, Teacher Resource #6.

### **Extension/Follow Up:**

- Re-enact the crime after solving it.
- Design a necklace with a different pattern.
- Create a code; send a message to a friend using it.
- Write a “confession” from the point-of-view of the thief.

### **Authors:**

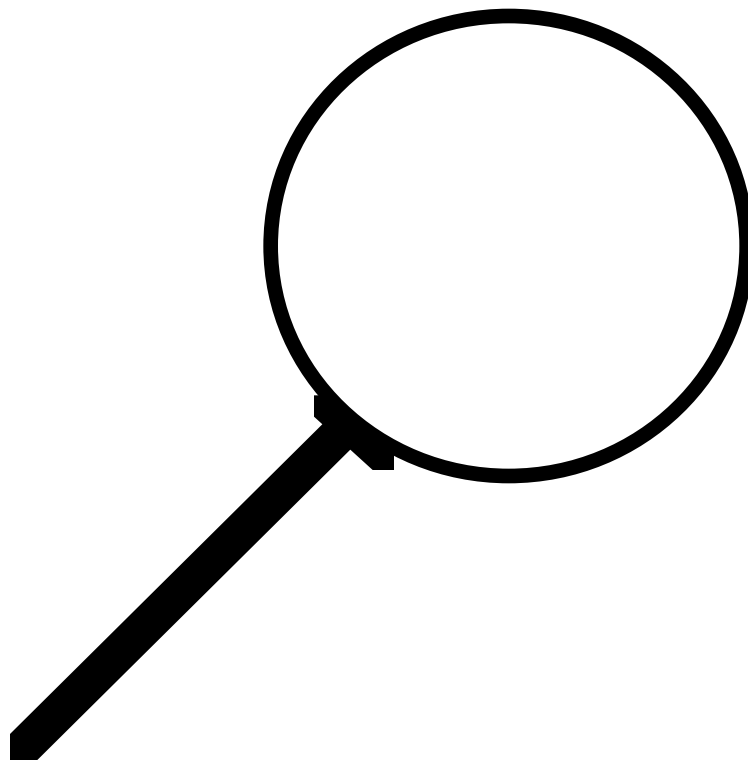
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## The Case of the Jinxed Jewels

You are a detective working for the police. You have been assigned to this case by your captain. Over the next few days, you will look for clues while reading and solving problems. Your job is to use these clues to determine who is the person that stole the “Blue Blood” Necklace from Mrs. Ima Sorich.

Once you have solved the case, it will be your responsibility to create a “Wanted!” poster describing the criminal so that it can be distributed to law enforcement agencies across the country.



## Student Resource Sheet #2

### EXTRA! EXTRA!

(Snob Hill)--The famous "Blue Blood" necklace belonging to Mrs. Ima Sorich, the well-known art collector, was discovered missing at 10:30 p.m. on March 16, 1999.

The necklace was reported missing from the dining room of Mrs. Sorich's home on Snob Hill.

Mrs. Sorich had just given a small dinner party for four of her closest friends. Guests included:

Yuri Handsome, the prominent magazine publisher, whose \$100,000 printing press recently broke.

Lefty Weasel, Mrs. Sorich's brother, who was just released from prison for burglary.

Patty Plain, the local librarian, who is in charge of the new library's construction.

Georgia Gorgeous, Mrs. Sorich's best friend, who just wrecked her gold Rolls-Royce.



Yuri Handsome



Lefty Weasel



Patty Plain



Georgia Gorgeous

**Curious Clues**  
**Cooperative Pattern Cards**

<p><b>CLUE #1</b> There are 37 jewels in the necklace. Each end of the necklace has 5 rubies and 1 diamond in the center.</p>	<p><b>CLUE #2</b> Of the 26 jewels that are left, there are 13 on each side of the diamond. Each half of the necklace is identical.</p>
<p><b>CLUE #3</b> There is 1 pearl in between every group of jewels.</p>	<p><b>CLUE #4</b> The next group of jewels after the rubies are the emeralds.</p>
<p><b>CLUE #5</b> The group of jewels closest to the diamond is the amethysts.</p>	

## CURIOUS CLUES

The police have started talking to the 5 people present at the dinner party about the missing necklace. No one at the dinner party described the necklace the same way. The police have uncovered 5 clues about the missing necklace. Each clue came from a different witness. The police are baffled!

1. Use the clues to construct a model of the necklace to make it easier for the police to identify it. To help you as you work, use the materials provided and the list below.

RED.....RUBIES

GREEN.....EMERALDS

YELLOW.....PEARLS

BLUE.....SAPPHIRES

PURPLE.....AMETHYSTS

ORANGE.....DIAMONDS

## Student Resource Sheet #4b

2. Once you've finished constructing the necklace, draw the necklace you created below:
3. Describe the pattern you see in the necklace's design.
4. When Mrs. Sorich gets her necklace back, she might want to add jewels to the ends of the necklace. If she wanted to continue the same pattern and add a new jewel, topaz (which is brown), how many topazes would she need to continue the pattern? How many pearls? Show your work and explain your answer.



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RED (*R*).....RUBIES

GREEN (*G*)..... EMERALDS

YELLOW (*Y*).....PEARLS

BLUE (*B*).....SAPPHIRES

PURPLE (*P*).....AMETHYSTS

ORANGE (*O*).....DIAMONDS

**Teacher Resource Sheet #1b**

2. Once you've finished constructing the necklace, draw the necklace you created below:

**RRRRRYGGGGYBBBYAAYOYAAAYBBBYGGGGYRRRRR**

3. Describe the pattern you see in the necklace's design.

*The pattern is both growing AND shrinking, depending on which side is being looked at.*

4. When Mrs. Sorich gets her necklace back, she might want to add jewels to the ends of the necklace. If she wanted to continue the same pattern and add a new jewel, topaz (which is brown), how many topazes would she need to continue the pattern? How many pearls? Show your work and explain your answer.

*She will need 12 topazes (6 for each end) and 2 pearls.*

## CRACK THE CODE

The police found a scrap of paper underneath the dining room table where the dinner party was held. The note was written in code. It is your job to decipher the code to find out what the note says. The police have already figured out that the numbers in the message are a code for the letters in the alphabet. So far, they know:

$$4-15-7 = \text{DOG}$$

1. Crack the code! Use the alphabet below to help you.

4        7  
A B C D E F G H I J K L M

15  
N O P Q R S T U V W X Y Z

2. How did you break the code? What pattern did you find?

**Student Resource Sheet #5b**

3. Use what you've discovered to decipher the note found under the dining room table:

19-8-5    19-20-15-12-5    20-8-5

14-5-3-11-12-1-3-5!

4. Using the message in the note you've decoded, what suspects (if any) can you eliminate? Why? Explain your answer.

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1. Crack the code! Use the alphabet below to help you.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	B	C	D	E	F	G	H	I	J	K	L	M	N

15	16	17	18	19	20	21	22	23	24	25	26
O	P	Q	R	S	T	U	V	W	X	Y	Z

2. How did you break the code? What pattern did you find?

*The numbers go up one for every letter.*

**Teacher Resource Sheet #2b**

3. Use what you've discovered to decipher the note found under the dining room table:

19-8-5    19-20-15-12-5    20-8-5

14-5-3-11-12-1-3-5!

*She stole the necklace!*

4. Using the message in the note you've decoded, what suspects (if any) can you eliminate? Why? Explain your answer.

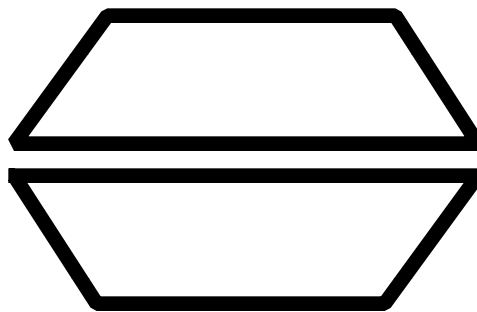
*You can eliminate both men because the note says "she."*

## TURNING THE TABLES TOPSY-TURVY

Originally, Mrs. Sorich wanted to have 29 people at her dinner party rather than 4. Help Jeeves the Butler figure out how many tables would've been needed and how they would've been arranged in order to seat 29 people. This is the only shape of table that was available:

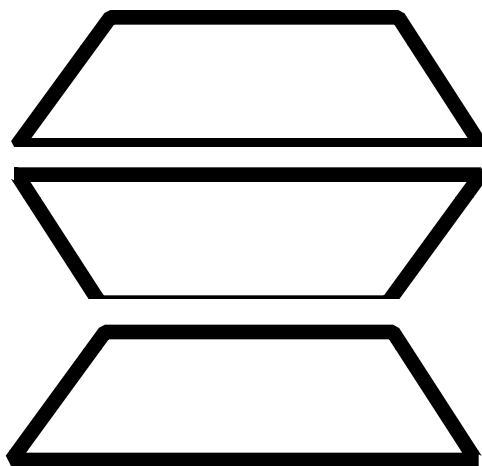


It seats 4 people. But, if Jeeves pushes 2 together, the tables will look like this:



This new table seats 6 people, since no one can fit in the middle.

Three tables looks like:



How many people can sit here now?

1. Complete the chart that shows the relationship between the number of tables and the number of seats.

<u># of Tables</u>	<u># of Seats</u>
1	4
2	6
3	
4	
5	

2. Describe mathematically what is happening in the “# of Tables” column.



**Student Resource Sheet #6c**

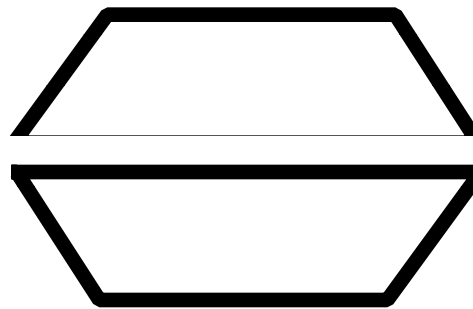
3. Describe mathematically what is happening in the “# of Seats” column.
4. As the number of tables increases, what happens to the number of seats?
5. What is the relationship between the number of tables and the number of seats?
6. How many people could sit at 11 tables? Explain how you got your answer.
7. How many tables would you need to seat Mrs. Sorich’s original 29 guests? Explain how you got your answer.

## TURNING THE TABLES TOPSY-TURVY

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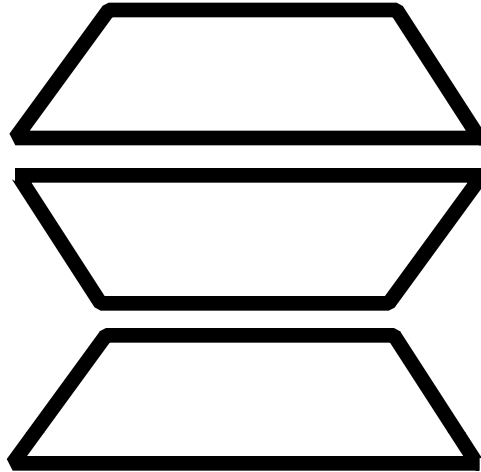


It seats 4 people. But, if Jeeves pushes 2 together, the tables will look like this:



This new table seats 6 people, since no one can fit in the middle

Three tables looks like:



How many people can sit here now? 8

1. Complete the chart that shows the relationship between the number of tables and the number of seats.

<u># of Tables</u>	<u># of Seats</u>
1	4
2	6
3	8
4	10
5	12

2. Describe mathematically what is happening in the “# of Tables” column.

*The # of tables is increasing by 1.*

3. Describe mathematically what is happening in the “# of Seats” column.

*The number of seats is increasing by 2.*

4. As the number of tables increases, what happens to the number of seats?

*The number of seats increases, too.*

5. What is the relationship between the number of tables and the number of seats?

*$(\# \text{ of tables} \times 2) + 2 = \# \text{ of seats}$*

6. How many people could sit at 11 tables? Explain how you got your answer.

*$(11 \times 2) + 2 = 24$*

*24 people*

7. How many tables would you need to seat Mrs. Sorich’s original 29 guests? Explain how you got your answer.

*$(14 \times 2) + 2 = 30$*

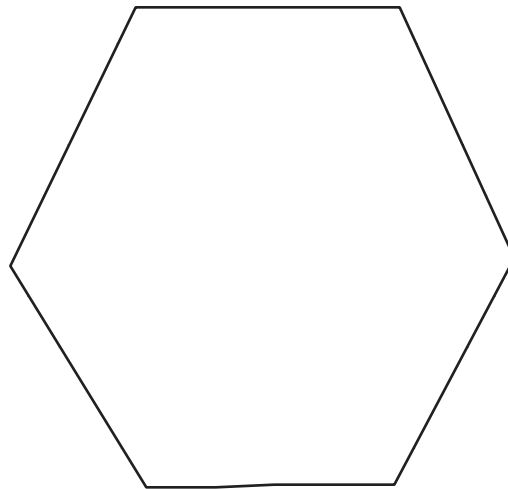
*14 tables (because 13 tables seats 28)*

## WHO SITS WHERE?

After questioning the suspects, the police feel that the coded scrap of paper belonged to the thief. They also believe that the thief accidentally dropped the note under their chair. Now all the police need to do is determine who sat where at the table. Can you help them?

Here's the information the police have so far. Discuss the clues with your group to figure out where each person sat. Use the diagram to label where everyone sat.

Georgia  
Gorgeous



## Student Resource Sheet #7b

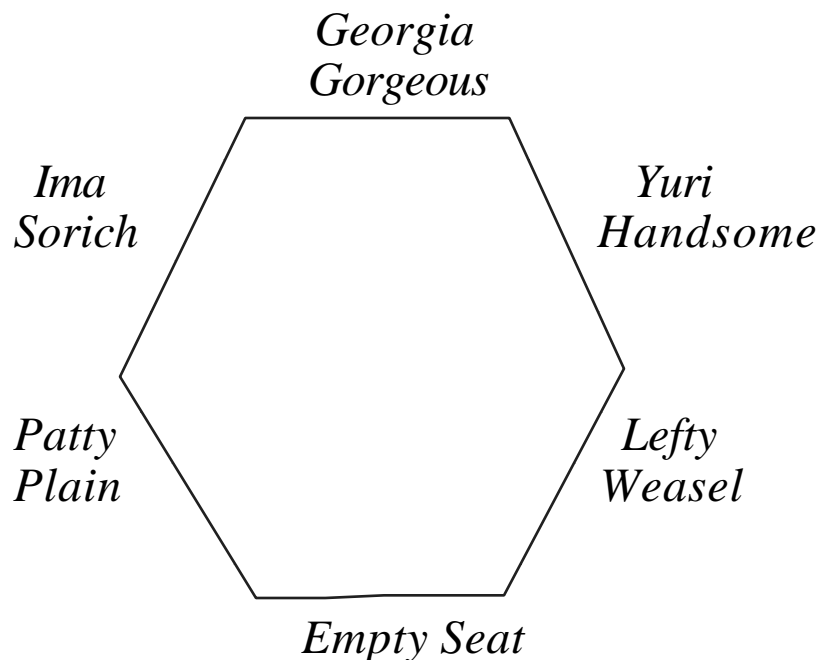
- Clue # 1: One seat was left empty.
- Clue # 2: Georgia Gorgeous sits across from the empty seat.
- Clue # 3: Yuri Handsome sits to the left of Georgia Gorgeous.
- Clue # 4: Lefty Weasel sits next to Yuri Handsome.
- Clue # 5: Georgia Gorgeous sits next to her best friend.
- Clue # 6: The thief sits next to the empty seat.

SO WHO'S THE THIEF?

## WHO SITS WHERE?

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## Teacher Resource Sheet #4b

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- Clue # 4: Lefty Weasel sits next to Yuri Handsome.
- Clue # 5: Georgia Gorgeous sits next to her best friend.
- Clue # 6: The thief sits next to the empty seat.

SO WHO'S THE THIEF?

*Patty Plain*



WANTED!!!


**WHO:** \_\_\_\_\_

**WHAT:** \_\_\_\_\_

**WHERE:** \_\_\_\_\_

**WHEN:** \_\_\_\_\_

**WHY:** \_\_\_\_\_



WANTED!!!

**WHO:** *Patty Plain is the thief or criminal.*

**WHAT:** *She stole the famous “Blue Blood” necklace.*

**WHERE:** *Snob Hill is where the crime occurred.*

**WHEN:** *The crime occurred on March 16, 1999 at  
10:30 p.m.*

**WHY:** *She stole the necklace to get money for the new  
library.*

## **PROBLEM SOLVING SCORING RUBRIC**

- 5 - Answers all five questions (who, what, when, where, why) correctly.
- 4 - Answers four of the five questions correctly.
- 3 - Answers three of the five questions correctly.
- 2 - Answers two of the five questions correctly.
- 1 - Answers one of the five questions correctly.
- 0 - Answers none of the five questions correctly.

## **LANGUAGE USAGE SCORING RUBRIC**

- 4 - No mechanical or grammatical errors. Answers in complete sentences.
- 3 - One or two mechanical or grammatical errors. Answers in complete sentences.
- 2 - Three or four mechanical or grammatical errors. Some answers may be incomplete sentences.
- 1 - Five or six mechanical or grammatical errors. Several answers may be incomplete sentences.
- 0 - Seven or more mechanical or grammatical errors. Several answers may be incomplete sentences.